

Clean, Replacement Claim 42:

42. The purified composition of claims 37, 38, 39, 40, 41, and 42, wherein the chondroitin polymer is represented by a structure, (Beta-1,4-GlcUA-beta-1,3-GalNAc)<sub>n</sub>, wherein n is a positive integer greater than or equal to 1.

Newly Added Claims:

111. A chondroitin polymer produced *in vitro* by the method comprising the steps of:

- providing a chondroitin synthase;
- placing the chondroitin synthase in a medium suitable for the expression of a chondroitin polymer; and
- extracting the chondroitin polymer out of the medium.

112. The chondroitin polymer of claim 111, wherein in the step of providing a chondroitin synthase, the chondroitin synthase is from *Pasteurella multocida*.

113. The chondroitin polymer of claim 112, wherein in the step of providing a chondroitin synthase, the chondroitin synthase is from *Pasteurella multocida* and has an amino acid sequence as set forth in SEQ ID NO:2 or 4.

114. The chondroitin polymer of claim 112, wherein in the step of providing a chondroitin synthase, the chondroitin synthase from *Pasteurella multocida* is a nucleotide sequence as set forth in SEQ ID NO:1 or 3.

115. A chondroitin polymer produced *in vivo* by the method comprising the steps of:

- providing a chondroitin synthase;
- placing the chondroitin synthase in a native or recombinant organism, thereby providing a native or recombinant organism having a chondroitin synthase therein;
- placing the native or recombinant organism having a chondroitin synthase therein in a medium suitable for the expression of a chondroitin polymer; and
- extracting the chondroitin polymer.

116. The chondroitin polymer of claim 115, wherein in the step of providing a chondroitin synthase, the chondroitin synthase is from *Pasteurella multocida*.

117. The chondroitin polymer of claim 116, wherein in the step of providing a chondroitin synthase, the chondroitin synthase is from *Pasteurella multocida* and has an amino acid sequence as set forth in SEQ ID

NO:2 or 4.

118. The chondroitin polymer of claim 116, wherein in the step of providing a chondroitin synthase, the chondroitin synthase from *Pasteurella multocida* is a nucleotide sequence as set forth in SEQ ID NO:1 or 3.

119. A chondroitin polymer, produced by the method comprising the steps of:

- introducing a purified nucleic acid segment having a coding region encoding enzymatically active chondroitin synthase into a host organism, wherein the host organism contains nucleic acid segments encoding enzymes which produce UDP-GlcUA and UDP-GalNAc;
- growing the host organism in a medium to secrete chondroitin polymer; and
- recovering the secreted chondroitin polymer.

120. The chondroitin polymer of claim 119, wherein in the step of recovering the chondroitin polymer, the chondroitin polymer is extracted from the medium or the cells or combinations thereof.

121. The chondroitin polymer of claim 120, further comprising the steps

of purifying the extracted chondroitin polymer.

122. The chondroitin polymer of claim 119, further comprising the step of sulfating the chondroitin polymer.

123. The chondroitin polymer of claim 119, further comprising the step of epimerizing the chondroitin polymer.

124. The chondroitin polymer of claim 119, wherein in the step of growing the host organism, the host organism secretes a structurally modified chondroitin polymer.

125. The chondroitin polymer of claim 119, wherein in the step of growing the host organism, the host organism secretes a chondroitin polymer having a modified size.

126. A heterologous polypeptide produced in a host cell by the recombinant method comprising the steps of:

- (a) transforming the host cell with a vector comprising a promoter and a nucleic acid construct comprising a nucleic acid sequence encoding a desired heterologous polypeptide, wherein said promoter comprises a transcriptional activating region of the

nucleic acid sequence set forth in SEQ ID NO:1 or 3, and wherein the nucleic acid construct is positioned in operable linkage with the promoter;

- (b) culturing the transformed host cell of step (a); and
- (c) recovering the heterologous polypeptide from the transformed host cell of step (b).

127. A chondroitin polymer produced by a process of fermentation of a cell expressing a chondroitin synthase enzyme having an amino acid sequence in accordance with SEQ ID NO:2 or 4.

128. A chondroitin polymer produced by a process for the *in vitro* sulfation of a chondroitin polymer, wherein the chondroitin polymer is produced by a chondroitin synthase and the chondroitin polymer is sulfated by either chemical or enzymatic means.

129. The chondroitin polymer of claim 128, wherein the chondroitin synthase is a *Pasteurella multocida* chondroitin synthase.

130. The chondroitin polymer of claim 129, wherein the *Pasteurella multocida* chondroitin synthase is as set forth in SEQ ID NO:2 or 4.